Research Development Fund – FALL 2018 Application Template
SUBMISSION DEADLINE: ***Monday - October 22, 2018 at 12 noon CDT*** **to rdf@tamu.edu**

*****Applications that exceed page limits for any section or do not follow template will not be reviewed*****

Application Title: Robotics and Biophotonics Enabled Plant and Pathogen Phenotyping

Lead contact for RDF Application:

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Key Participating Units: Texas A&M AgriLife Research, College of Agriculture and Life Sciences, College of Engineering, College of Science

Anticipated Request Amount ($): $1,940,000

Executive summary of this application to utilize Research Development Funds:

This proposal requests funding for robotics to deploy biophotonics sensors in close proximity to plants for diagnostic purposes. The robotics system will enable the automated collection of biophotonics sensor-based plant phenotypes that in conjunction with advanced genomics and machine learning approaches are creating novel opportunities to accelerate the improvement of plant design, productivity and resilience. The Biophotonics Initiative is accelerating the development of Raman-based sensors capable of detecting variation in plant composition, responses to environmental variation and plant pathogens/pests. The initiative is also funding the construction of a novel plant growth facility that replicates field conditions to facilitate the design, testing, and optimization of advanced biophotonic technologies for use in the field. This proposal requests funds for a gantry-based robotics system that can optimally deploy sensors of various types, with specific emphasis on Raman spectroscopy techniques, affixed to the end of a robotic arm and used to collect data from individual plants. The dexterity of the robotic arm enables the sensors to collect data from virtually any position in close proximity to each plant, a unique capability in high-throughput phenotyping research. The robotic arm can be programmed to operate quickly and safely in a specified fashion to enable data collection on all plants in a growth facility in a relatively short period of time. The robotic arms can have many different types of sensors mounted on them, so Raman-based sensors can be applied in conjunction with thermal and hyperspectral sensors. A longer term goal is to build robotic systems armed with biophotonic sensors that can be deployed to survey crop health in the field.